CLAIMS

What is claimed is:

1. A read/write head for use in a data storage device to reduce pole tip protrusion, comprising:

an air bearing surface;

a pole tip region;

an insulation layer formed adjacent to the pole tip region;

a coil embedded in the insulation layer contributing to a protrusion force that generates a pole tip protrusion; and

a layer of thermally expansive material formed over the insulation layer, and recessed from the air bearing surface, that expands in response to heat absorption, causing a rotational moment of force that counteracts the protrusion force thus reducing the pole tip protrusion.

2. The read/write head of claim 1, wherein the layer of thermally expansive material is made at least in part of photoresist material.

3. The read/write head of claim 1, wherein the layer of thermally expansive material has a coefficient of thermal expansion that ranges between approximately 5 ppm/K and 100 ppm/K.

4. The read/write head of claim 1, further comprising a write element; and

wherein the layer of thermally expansive material is formed over substantially the entire surface of the write element.

5. The read/write head of claim 4, further comprising a diffuser formed on top of the insulation layer; and

wherein the layer of thermally expansive material is formed over the diffuser.

6. The read/write head of claim 5, wherein the diffuser is formed over substantially the entire surface of the write element.

7. The read/write head of claim 5, wherein the write element is comprised of a first pole layer P1, a second pole layer P2, and a third pole P3.

8. The read/write head of claim 1, further comprising a read element.

9. A write element for use in a read/write head having an air bearing surface to reduce pole tip protrusion, comprising:

a pole tip region;

an insulation layer formed adjacent to the pole tip region;

a coil embedded in the insulation layer contributing to a protrusion force that generates a pole tip protrusion; and

a layer of thermally expansive material formed over the insulation layer, and recessed from the air bearing surface, that expands in response to heat absorption, causing a rotational moment of force that counteracts the protrusion force thus reducing the pole tip protrusion.

10. The write element of claim 9, wherein the layer of thermally expansive material is made at least in part of photoresist material.

11. The write element of claim 9, wherein the layer of thermally expansive material has a coefficient of thermal expansion that ranges between approximately 5 ppm/K and 100 ppm/K.

12. The write element of claim 9, further comprising a diffuser formed on top of the insulation layer; and

wherein the layer of thermally expansive material is formed over the diffuser.

13. The write element of claim 9, wherein the write element is comprised of a first pole layer P1, a second pole layer P2, and a third pole P3.

14. A disk drive comprising:

a base;

a spindle motor attached to the base;

a disk positioned on the spindle motor;

a head stack assembly coupled to the base and comprising:

an actuator body;

an actuator arm cantilevered from the actuator body; and

a read/write head coupled to the actuator arm, and including:

an air bearing surface;

a pole tip region;

an insulation layer formed adjacent to the pole tip region;

a coil embedded in the insulation layer contributing to a protrusion force that generates a pole tip protrusion; and

a layer of thermally expansive material formed over the insulation layer, and recessed from the air bearing surface, that expands in response to heat absorption, causing a rotational moment of force that counteracts the protrusion force thus reducing the pole tip protrusion.

15. The disk drive of claim 14, wherein the layer of thermally expansive material is made at least in part of photoresist material.

16. The disk drive of claim 14, wherein the layer of thermally expansive material has a coefficient of thermal expansion that ranges between approximately 5 ppm/K and 100 ppm/K.

17. The disk drive of claim 14, further comprising a write element; and

wherein the layer of thermally expansive material is formed over substantially the entire surface of the write element.

18. The disk drive of claim 14, further comprising a diffuser formed on top of the insulation layer; and

wherein the layer of thermally expansive material is formed over the diffuser.

19. The disk drive of claim 18, wherein the diffuser is formed over substantially the entire surface of the write element.

20. The disk drive of claim 14, further comprising a read element.